Goddard Procedures and Guidelines

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EFFECTIVE DATE:	July 27, 2004	**NAME:**	A. V. Diaz
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Responsible Office: 300/Office of Systems Safety and Mission Assurance

Title: The GSFC Quality Manual

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PREFACE

P.1 PURPOSE

The purpose of the GSFC Quality Manual is to define the Quality Management System (QMS) as implemented at the Goddard Space Flight Center (GSFC) at Greenbelt, Maryland, and at Wallops Flight Facility (WFF), Wallops Island, Virginia.

P.2 APPLICABILITY

The Quality Manual applies to all organizational elements for the performance of work that is in-scope to the QMS and the Center's certification to ANSI/ISO/ASQ Q9001-2000.

P.3 AUTHORITY

NPD 1280.1, NASA Management System Policy

P.4 REFERENCES

a. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements (referred to herein as ISO 9001-2000)
b. ANSI/ISO/ASQ Q9000-2000, Quality Management Systems – Fundamentals and Vocabulary
c. Goddard's Strategic Implementation Plan
d. NPD 1000.1, NASA Strategic Plan
e. QMS Directives – See Note below and Table 1

NOTE: The titles of all GPG's referenced herein are as of the date of release of this Quality Manual. Current directives information can be found in the GSFC Directives Management System at http://gdms.gsfc.nasa.gov/gdms/.

P.5 CANCELLATION

GPG 1280.1, The GSFC Quality Manual

P.6 SAFETY

QMS safety requirements are identified as appropriate in governing directives and procedures (see Table 1).

P.7 TRAINING

Specific training requirements are identified as appropriate in governing directives and procedures (see Table 1).

P.8 RECORDS

Record Title	Record Custodians	Retention
Approved waivers against Center QMS requirements (e.g., GPD or GPG requirements)	(1) QMS Management Representative (QMSR); (2) Individual or Organization that requested the waiver	(1)*NRRS 1/26.5A - Destroy when 7 years old. (2)) NRRS 1/26.5B – Destroy when 3 years old or when no longer needed, whichever is sooner.
Approved waivers against Directorate or sub-Directorate QMS requirements (e.g., PG or WI requirements)	(1) Organization that approved the waiver; (2) Individual or organization that requested the waiver	(1)*NRRS 1/26.5A - Destroy when 7 years old. (2)) NRRS 1/26.5B – Destroy when 3 years old or when no longer needed, whichever is sooner.

** NRRS – NASA Records Retention Schedules (NPR 1441.1)*

Other QMS records are identified as appropriate in governing directives and procedures (see Table 1).

P.9 METRICS

QMS metrics are identified as appropriate in governing directives and procedures (see Table 1).

P.10 DEFINITIONS

Unless otherwise addressed herein, the definitions given in ANSI/ISO/ASQ Q9000-2000 apply to the implementation of the QMS. The following additional definitions are provided to assist in the understanding and application of the QMS:

a. Contractor - A non-federal entity that provides goods or services to GSFC as defined through a purchase order or contractual arrangement.

b. Customer - The recipient of a product or service provided by GSFC. For purposes of the QMS, a customer is assumed to be external to NASA. NASA organizations with which GSFC transacts business are considered to be internal customers for purposes of the QMS.

c. Customer Agreement - Space Act Agreement, Program or Project Plan, Research Plan, or any other legal commitment entered into by GSFC to deliver a product or service.

d. Exclusion – An exception granted to the Product Realization provisions of ISO 9001-2000.

e. Executive Council - Collectively, the Heads of all of the Directorates and Functional Offices that report to the Center Director.

f. Goddard Directives Management System (GDMS) - The electronic system that maintains the collection of directives and associated forms issued by GSFC along with the procedures for establishing and maintaining such collection.

g. Performing Organization - The GSFC organization (directorate, functional staff office, project, etc.) that is assigned the responsibility of producing a product or otherwise satisfying a customer's requirement.

h. Product - In this document, systems, hardware, software, data, documentation, services and/or processed material resulting from work activities at GSFC that have been defined to be in-scope to the QMS.

i. Product Design Lead (PDL) - The manager or leader with overall responsibility for managing the product design activity.

j. Product Manager - The individual designated as having management responsibility for a product.

k. Quality Management System Council (QMSC) - A group of representatives from each GSFC Directorate, chaired by the QMS Representative (QMSR), responsible for advising the QMSR regarding QMS administration, maintenance, and status reporting.

l. Quality Management System Representative (QMSR) - A GSFC manager, designated by and reporting directly to the Center Director, who has responsibility and authority for the effective implementation of the QMS.

m. Supplier - An organization that provides a product or service to GSFC.

n. Waiver – An approved exception to a GSFC-required process.

PROCEDURES

1. QUALITY MANAGEMENT SYSTEM

1.1 General

This manual and supporting QMS directives and procedures identify the QMS processes and their application throughout GSFC. The QMS provides a framework whereby the sequence and interaction of processes are defined and accomplished. The top-level directives established for the QMS are identified in Table 1. Table 1 shows the correspondence between the ISO requirements and the GPGs that describe the GSFC processes. The interaction of the QMS processes is depicted in Figure 1.

1.2 Documentation

1.2.1 General

The QMS includes:

a. The GSFC Quality Policy and statements of objectives (see 2.3 and 2.4);

b. This Quality Manual;

c. Documented directives required by the ISO 9001:2000 standard and by GSFC to ensure the effective planning, operation and control of processes; and

d. Records (as identified in governing directives in Table 1)

1.2.2 Scope of the QMS

The scope of the QMS and the GSFC ISO 9001 certification includes all products resulting from the following GSFC core processes as identified in the GSFC Strategic Implementation Plan. The scope also includes the infrastructure needed to achieve conformity to product requirements, as established in the GDMS, or as otherwise documented in writing by the responsible Director of, e.g., Project Plans.

a. Science Enabling - This includes the grants process; providing data to the science community; science support tools; the proposal support process; and the science research process.

b. Technology Development - This includes the technology research and development management process; mission-specific products; technology transfer process; and technology commercialization.

c. Systems Development - This includes space flight systems; sounding rocket, aircraft and balloon carrier systems; and ground-based mission operating and data acquisition systems. Sounding rocket and balloon experiment payload development is included where external commitments exist or where needed to meet the safety, interface control, or operational requirements of the carrier systems.

d. Program/Project Management - This includes cost, schedule and technical control; review and reporting; procurement; mission operations; and safety and mission assurance.

e. Communicate Knowledge - This includes the research publication process and the maintenance of those databases accessible to the public whereby the results of GSFC research are shared.

There are no exclusions to the Product Realization requirements of ISO 9001-2000.

1.2.3 Control of Documents

The documents that implement the QMS are consistent with Government and Agency requirements and regulations. The range and detail of procedures is dependent upon the complexity of the work methods used and the skills and training needed to carry out activities in accordance with GPG 1410.1.

GSFC has established and documented procedures to control all Center-generated and external documentation and data. Goddard Policy Directives (GPDs), Goddard Procedures and Guidelines (GPGs), Procedures and Guidelines (PGs), and Work Instructions (WIs) are prepared and maintained within the GDMS. Documents or data that define requirements, plans, or design, build, interface, and production information are controlled documents subject to approval before issuance or alteration.

1.2.4 Control of Records

GSFC has established and documented procedures for the identification, storage, protection, retrieval, retention and disposition of records, including pertinent records from GSFC customers and suppliers, in accordance with GPG 1440.7.

2. MANAGEMENT RESPONSIBILITY

2.1 Management Commitment

The Center Director and Executive Council are committed to the development, implementation and continual improvement of the effectiveness of the QMS. The quality policy established in this Quality Manual has the principle objective to enhance GSFC ability to achieve program, institutional and Agency goals and objectives as stated in the GSFC Strategic Implementation Plan and the NASA Strategic Plan.

The Center Director and Executive Council provide evidence of commitment by communicating to the organization the importance of meeting customer as well as statutory and regulatory requirements pertaining to GSFC product, conducting management reviews, and ensuring the availability of resources.

2.2 Customer Focus

Through the conduct of management reviews and established lines of authority, executive management ensures that customer requirements are determined and are met with the aim of enhancing customer satisfaction.

2.3 Quality Policy

GSFC QUALITY POLICY

With Customer Satisfaction as our primary goal:

- GSFC is committed to meeting or exceeding our customers' requirements,
- We achieve excellence in all of our efforts

The GSFC Quality Policy is communicated to personnel via the GSFC QMS web page, employee training, QMS reviews with executive management, and in our daily activities. The Center Director and Executive Council ensure that the policy is appropriate for the purpose of GSFC, provides a framework for establishing and reviewing objectives, and is reviewed for continuing suitability. Goddard establishes, measures, and achieves its quality objectives, while continually improving the effectiveness of the QMS. Every GSFC manager and supervisor involved in work that is applicable to the QMS is responsible for ensuring the quality policy is understood, implemented, and maintained at all levels of their organization.

2.4 Quality Objectives

GSFC plays a major role in performing and enabling research in Earth Science and Space Science. The Center develops technology and implements systems and programs that support this role. In addition, GSFC has other responsibilities in the areas of NASA Programs and Missions support, sounding rockets, scientific balloons, and observational science and scientific aircraft missions.

GSFC's Quality Objectives, the NASA mission goals to which the GSFC provides a primary or supporting contribution as identified in Goddard's Implementation Plan, are listed below:

Goal 1: Understand Earth's system and apply Earth system science to improve the prediction of climate, weather, and natural hazards.

Goal 2: Create a more secure world and improve quality of life by investing in technologies and collaborating with other agencies, industry, and academia.

Goal 3: Explore the solar system and the universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.

Goal 4: Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.

Goal 5: Engage the public in shaping and sharing the experience of exploration and discovery.

Goal 6: Ensure the provision of space access and improve it by increasing safety, reliability, and affordability.

Goal 7: Extend the duration and boundaries of human space flight to create new opportunities for exploration and discovery.

Goal 8: Enable revolutionary capabilities through new technology.

Directorates/Offices responsible for work that is within scope of the QMS develop objectives and metrics appropriate at their level to support fulfillment of the Center Quality Objectives, consistent with the strategies and GSFC's mission.

Directorate/Offices internally report on objectives measurements. Appropriate objective measurements are then compiled for measurement of Center objectives and presentation to executive management for analysis and appropriate action.

2.5 Responsibility, Authority and Communication

2.5.1 Responsibility and Authority

The Center Director is given the authority by the Agency to manage all aspects of GSFC within Government and Agency laws and regulations. This includes authority to implement, maintain, and improve the QMS. The Center Director has delegated responsibility and authority over the QMS to the Executive Council and to all managers and supervisors at the Center.

GSFC is organized into elements called Directorates and Functional Offices. The Directors of and the Functional Office Chiefs make up the Executive Council that provides advice and support to the Center Director for the management of the Center and for the implementation of the QMS.

The GSFC organization chart is found in the Organization Manual.

Every GSFC manager and supervisor involved in work under the scope of the QMS is responsible for maintaining and implementing the QMS within their organizations, including establishing and documenting the necessary procedures, guidelines, and work instructions. This responsibility includes ensuring that their employees operate in compliance with the QMS and take appropriate actions when processes do not produce the required quality, and continually seeking to improve their processes.

2.5.2 Quality Management System Planning

The Center Director has established a Quality Management System Council (QMSC) that consists of representatives from each Directorate and Functional Office. The QMSC advises the QMS Management System Representative (QMSR) regarding the administration and maintenance of the QMS.

Responsibility for the planning of the QMS resides with the QMSR and the QMSC. The QMSC ensures that the integrity of the QMS is maintained when QMS changes are planned and implemented. The QMSC advises the QMSR on waiver requests against GPG requirements (see 3.).

The QMSC is responsible for the analysis of data, gathered through various tools and efforts, on the implementation and effectiveness of the QMS. The purpose of these analyses is to discern trends and opportunities for preventive action or continual improvement initiatives from a Center perspective. The results of these analyses and recommended actions are reported to Center management as part of QMS Management Reviews or in more immediate reporting opportunities.

2.5.3 Management Representative

The Center Director appoints the QMSR who is responsible for ensuring that the QMS is established, implemented and maintained across the Center. The QMSR reports to senior management on the performance of the QMS and opportunities for improvement. This reporting process also ensures promotion of awareness of customer requirements throughout the organization. The QMSR is responsible for reviewing the GSFC Quality Manual and recommending revisions to ensure the Manual is maintained in a current status.

2.5.4 Internal Communication

Internal communication takes place regularly in accordance with GPG 1060.1 and GPG 1060.2. QMS management reviews and resulting actions are accessible to all employees on the QMS Home Page at http://arioch.gsfc.nasa.gov/iso9000/index.htm.

2.6 Management Review

The QMSR reports on the continuing suitability, adequacy and effectiveness of the QMS to the Center Director and the Executive Council semi-annually. QMS metrics gathered during the reporting period are used to determine necessary improvements to the QMS. The QMS Management Review input is in accordance with GPG 1060.1. Review output consists of actions related to improvement of the QMS and its processes, improvement of product related to customer requirements, and resource needs.

3. WAIVERS

If a Goddard organization or sub-organization (e.g., a Project Office) determines that it is in the best interest of the Center, or that a customer commitment requires that specific QMS requirements be waived, the organization or sub-organization manager shall prepare a waiver request for concurrence. The memorandum shall identify:

- requirements to be waived,
- the reasons for requesting a waiver,
- alternate procedures or processes that will be used,
- potential effects on product quality.

If the waiver request seeks a deviation from a GPG, it requires the approval of the requesting organization or sub-organization, QMSR, and Center Director. If the waiver request seeks a deviation from a PG or WI, it requires approval of the authority that approved the PG or WI. If the waiver request involves a directive or process not related to the ISO 9001:2000 "product realization" requirements (section 7 of the standard), the waiver can be approved only if it does not require an exclusion to the standard. Organizations are not relieved from QMS compliance by the existence of a submitted waiver not yet approved or the intention of submitting a waiver. The requesting organization will maintain the approved waiver as a record.

Figure 1: Interrelationships Between QMS Processes

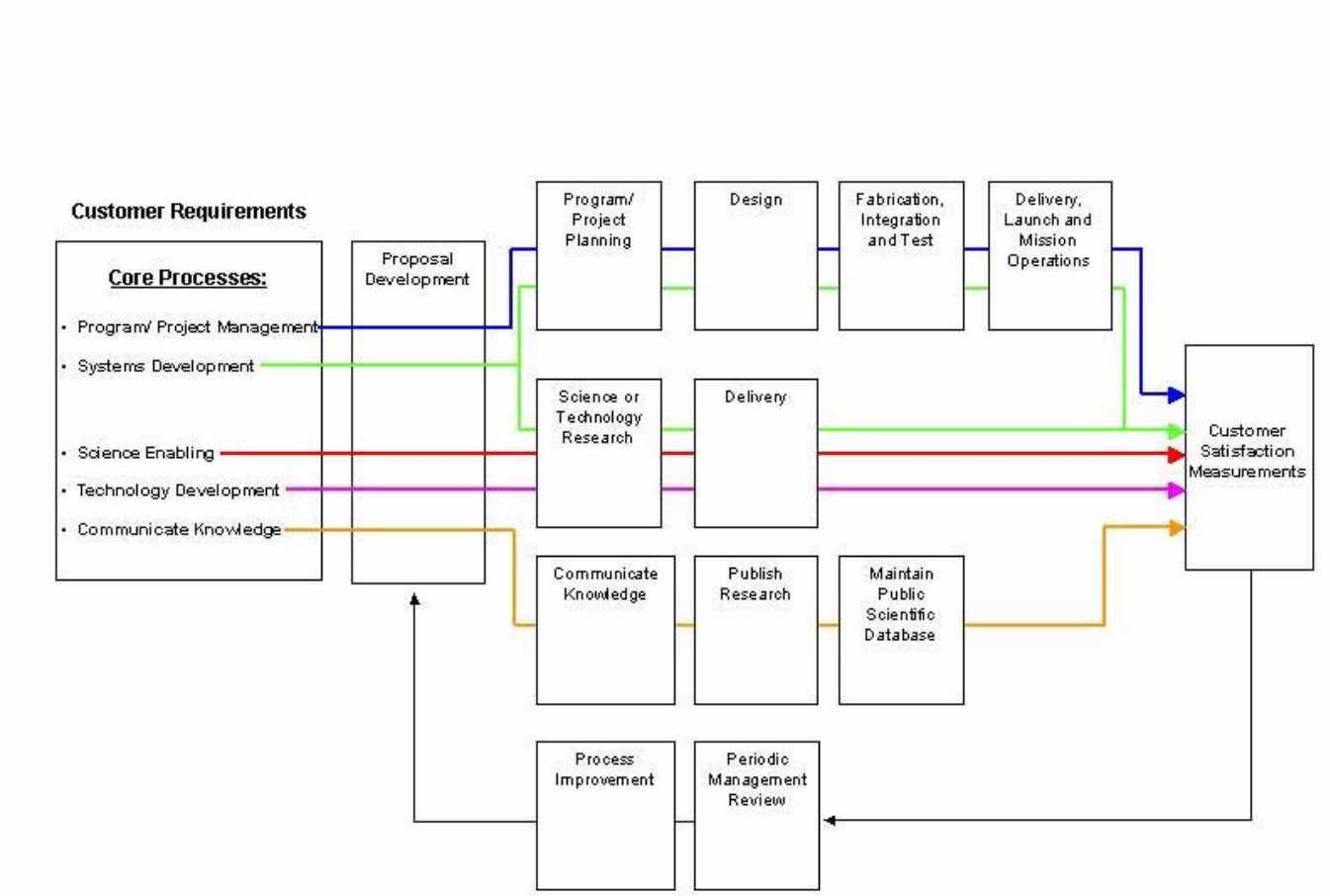

Table 1

Table 1 - Correspondence Between ISO 9001-2000 Requirements and QMS Documents	
ISO Requirement	**Governing GPG(s) – See Note Section P.4**
4.1 – QMS General Requirements	1280.1 GSFC Quality Manual
4.1 – Control of Outsourcing Processes	5100.1 Procurement 5100.2 Supplier Performance Evaluations 5100.3 Quality Assurance Letter of Delegation 5100.4 Supplier Quality Audits
4.2.1 – Documentation Requirements-General	1280.1 GSFC Quality Manual
4.2.2 – Quality Manual	1280.1 GSFC Quality Manual
4.2.3 – Control of Documents	1410.1 Directives Management 1410.2 Configuration Management 1420.1 Forms Management
4.2.4 – Control of Records	1440.7 Records Control
5.1 – Management Commitment	1280.1 GSFC Quality Manual 1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects 1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold
5.2 – Customer Focus	1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold 1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects
5.3 – Quality Policy	1280.1 GSFC Quality Manual 1060.1 Management Responsibility
5.4.1 – Quality Objectives	1280.1 GSFC Quality Manual 1060.2 Management Review and Reporting for Programs and Projects
5.4.2 – Quality Management System Planning	1280.1 GSFC Quality Manual 1060.1 Management Responsibility
5.5.1 – Responsibility, Authority	1280.1 GSFC Quality Manual 1060.1 Management Responsibility
5.5.2 Management Representative	1060.1 Management Responsibility
5.5.3 Internal Communications	1280.1 GSFC Quality Manual
5.6.1 – Management Review - General	1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects
5.6.2 – Review Input	1060.1 Management Responsibility

Table 1 - Correspondence Between ISO 9001-2000 Requirements and QMS Documents

ISO Requirement	Governing GPG(s) – See Note Section P.4
5.6.3 – Review Output	1060.1 Management Responsibility
6.1 – Provision of Resources	1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold 1060.1 Management Responsibility
6.2.1 – Human Resources-General	3410.2 Employee Competence and Quality Management System Training
6.2.2 – Competence, Awareness and Training	7120.1 Program and Project Management 3410.2 Employee Competence and Quality Management System Training
6.3 – Infrastructure	1280.1 GSFC Quality Manual
6.4 – Work Environment	5330.1 Product Processing, Inspection and Test
7.1 – Planning of Product Realization	5330.1 Product Processing, Inspection and Test 7120.1 Program and Project Management 7120.3 Management of Principal Investigator Mode Missions
7.2.1 – Determination of Requirements Related to the Product	1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold
7.2.2 – Review of Requirements Related to the Product	1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold
7.2.3 – Customer Communication	1310.1 Customer Commitments and Review 1310.2 Approval Process for GSFC Proposals Exceeding New Business Committee Threshold 1060.2 Management Review and Reporting for Programs and Projects 5340.2 Control of Nonconformances
7.3.1 – Design and Development Planning	7120.4 Risk Management 8700.1 Design Planning and Interface Management
7.3.2 – Design and Development Inputs	8700.2 Design Development
7.3.3 – Design and Development Outputs	8700.2 Design Development
7.3.4 – Design and Development Review	8700.4 Integrated Independent Reviews 8700.6 Engineering Peer Reviews 1060.2 Management Review and Reporting for Programs and Projects
7.3.5 – Design and Development Verification	8700.3 Design Validation

Table 1 - Correspondence Between ISO 9001-2000 Requirements and QMS Documents

ISO Requirement	Governing GPG(s) – See Note Section P.4
7.3.6 – Design and Development Validation	8700.3 Design Validation
7.3.7 – Control of Design and Development Changes	8700.2 Design Development 1410.2 Configuration Management
7.4.1 – Purchasing Process	5100.1 Procurement 5100.2 Supplier Performance Evaluations 5100.4 Supplier Quality Audits
7.4.2 – Purchasing Information	5100.1 Procurement
7.4.3 – Verification of Purchased Product	5100.1 Procurement 5100.3 Quality Assurance Letter of Delegation 4520.2 Receiving Inspection and Test
7.5.1 – Control of Production and Service Provision	5330.1 Product Processing, Inspection, and Test 6400.1 Logistics Support 8072.1 Process Control
7.5.2 – Validation of Processes for Production and Service Provision	5330.1 Product Processing, Inspection, and Test 8072.1 Process Control
7.5.3 – Identification and Traceability	5310.4 Identification and Traceability of Products 5330.1 Product Processing, Inspection, and Test
7.5.4 – Customer Property	5900.1 Control of Customer-Supplied Product
7.5.5 – Preservation of Product	6400.1 Logistics Support
7.6 – Control of Monitoring and Measuring Devices	8730.1 Calibration and Metrology
8.1 – Measurement, Analysis and Improvement-General	5330.1 Product Processing, Inspection, and Test 5340.2 Control of Nonconformances 1710.1 Corrective and Preventive Action 8072.1 Process Control
8.2.1 – Customer Satisfaction	1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects
8.2.2 – Internal Audit	9980.1 Internal Audit System
8.2.3 – Monitoring and Measurement of Processes	9980.1 Internal Audit System 1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects 1710.1 Corrective and Preventive Action
8.2.4 – Monitoring and Measurement of Product	5330.1 Product Processing, Inspection, and Test

Table 1 - Correspondence Between ISO 9001-2000 Requirements and QMS Documents

ISO Requirement	Governing GPG(s) – See Note Section P.4
8.3 – Control of Nonconforming Product	5340.2 Control of Nonconformances 5340.3 Preparation and Handling of Alerts, Safe Alerts and Advisories
8.4 – Analysis of Data	1060.1 Management Responsibility 1060.2 Management Review and Reporting for Programs and Projects
8.5.1 – Continual Improvement	1060.1 Management Responsibility
8.5.2 – Corrective Action	1710.1 Corrective and Preventive Action
8.5.3 – Preventive Action	1710.1 Corrective and Preventive Action

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	07/31/03	Entire manual was rewritten in response to ISO 9001:2000 requirements. GPG number changed as a result of release of NPD 1280.1. This baseline version replaces GPG 8730.3D. Substantive changes from GPG 8730.3D are: ▪ Quality policy signature page eliminated. ▪ GSFC organization chart (figure 1) replaced by reference to on-line chart maintained by OHR. ▪ 1.2.2: Language added to align QMS scope with GSFC Strategic Implementation Plan (SIP). First paragraph expanded to address infrastructure considerations. ▪ 1.2.2c: Moved mission operations to this process. ▪ 1.2.2e: Added to align with SIP. ▪ Deleted specific identification of QMSR by position in favor of more flexible description in 2.5.3. ▪ 2.2 added to address ISO 9001:2000 requirement. ▪ 2.4 added to align with SIP and to address ISO requirements with respect to objectives, objectives metrics, and analysis. ▪ 2.5.2 second paragraph added to address data analysis and continual improvement requirements of ISO 9001:2000. ▪ 2.5.4 added to address ISO 9001:2000 requirement. ▪ Section 3 re-written for clarity and visibility. Waivers previously addressed in Quality Planning (4.2.3) of GPG 8730.3D. ▪ Figure 1 added to address, in conjunction with Table 1, ISO 9001:2000 requirement regarding process interaction description. ▪ Table 1 expanded to address correspondence between ISO 9001:2000 requirements and implementing documents. Table correspondence used to eliminate redundant and ISO 9001:1994 related sections 4.2 through 4.20 of GPG 8730.3D.

CHANGE HISTORY LOG (continued)

Revision	Effective Date	Description of Changes
A	07/27/04	▪ P.4(c) title change and hyperlink established. Date left off of Plan title to accommodate future Plan updates without requiring Quality Manual update. ▪ P.8 – Record types separated. Custodians and record retention schedules re-defined. ▪ 1.1 – Deleted sentence "These directives have been updated to conform to ISO 9001-2000". ▪ 2.4 – Rewritten to reflect current GSFC Strategic Implementation Plan mission goals. ▪ Table 1 – Updated titles of GPG 3410.2, GPG 7120.1, and GPG 5340.3. Deleted references to canceled GPG 7120.2.